ABSTRACT OF THE DISCLOSURE

A magnetic sensor and method for making the sensor are disclosed. The sensor includes a giant-magnetoresistive sensing layer having a ferromagnetic free layer and a hard bias layer to maintain the free layer in a single-domain state or to stabilize the free layer. The hard bias layer has a coercivity of at least 2,000 Oe and a magnetic remnance times thickness at least twice the value of the saturation magnetization times thickness of the free layer. The hard bias layer includes a permanent magnetic layer formed on top of a seed layer made of the alloy TiW or other similar alloys. The seed layer may also be a bi-layer having a layer of TiW or ther similar alloys and a layer of soft magnetic material, with the former in contact with the permanent magnetic layer.